CLAIMS

WHAT IS CLAIMED IS:

1. A line terminating equipment comprising:

a requisite-bandwidth computing section for computing a requisite bandwidth for individual terminals as an increasing function of receipt information content and untransmitted information content, the receipt information content being content of transmission information precedingly received from the terminals, the untransmitted information content being notified by the terminals; and

a transmission-band determining section for determining a transmission bandwidth to be allotted to said individual terminals in a manner which is determined according to a comparison result of magnitude between a sum total of the requisite bandwidths and the transmission band of a transmission channel.

2. The line terminating equipment according to claim 1, wherein:

a known transmission bandwidth is allotted individually and constantly to all or a part of said terminals;

said untransmitted information content is notified as content of transmission information to be transmitted via a transmission bandwidth other than said known transmission bandwidth;

said receipt information content is measured as content of transmission information which is received via a transmission bandwidth other than said known transmission bandwidth; and

a transmission bandwidth to be allotted to each of said terminals is a transmission bandwidth other than said known transmission bandwidth.

3. A line terminating equipment comprising:

a requisite-bandwidth computing section for computing a requisite bandwidth for

individual terminals as an increasing function of receipt information content and untransmitted information content, the receipt information content being content of transmission information precedingly received from the terminals, the untransmitted information content being notified by the terminals; and

a transmission-band allotting section for allotting a transmission bandwidth to said individual terminals, the transmission bandwidth being equal to a product of the computed requisite bandwidth and a ratio δ, the ratio δ being a ratio of a transmission bandwidth of a transmission channel to a sum of: a product of a sum total of the requisite bandwidths and a coefficient γ (> 1); and a sum total of minimum transmission bandwidths to be allotted to said individual terminals.

4. The line terminating equipment according to claim 3, wherein:

a known transmission bandwidth is allotted individually and constantly to all or a part of said terminals;

said untransmitted information content is notified as content of transmission information to be transmitted via a transmission bandwidth other than said known transmission bandwidth;

said receipt information content is measured as content of transmission information which is received via a transmission bandwidth other than said known transmission bandwidth; and

the transmission bandwidth to be allotted to each of said terminals is a transmission bandwidth other than said known transmission bandwidth.

5. A line terminating equipment comprising:

an interfacing section for interfacing with a transmission channel formed in common between the interfacing section and a plurality of terminals;

a receipt-information-content measuring section for measuring receipt information

content which is content of transmission information received from said plurality of terminals;

an untransmitted-information-content collecting section for collecting untransmitted information content which is content of transmission information which is notified by said plurality of terminals, accumulated in the terminals, and has not been completely transmitted;

a requisite-bandwidth computing section for computing a requisite bandwidth for each of said plurality of terminals as an increasing function of the receipt information content measured and the untransmitted information content collected, the requisite bandwidth being a transmission bandwidth necessary to be allotted, the transmission bandwidth being a transmission bandwidth of said transmission channel;

a record-depending-bandwidth computing section for computing a record-depending bandwidth to be further allotted for each of said plurality of terminals, as an increasing function of a transmission bandwidth precedingly allotted and the receipt information content measured; and

a transmission-band allotting section for

allotting a sum of a deficient bandwidth and a bandwidth to said plurality of terminals via said interfacing section and said transmission channel when a sum total of the computed requisite bandwidths is smaller than the transmission bandwidth of said transmission channel, the deficient bandwidth being given as an increasing function of the untransmitted information content collected, the bandwidth being obtained by proportionally distributing a surplus bandwidth other than the deficient bandwidth in the proportion of the computed record-depending bandwidth to the whole record-depending bandwidth, and

allotting a sum of bandwidths of a minimum transmission band to be

individually allotted to said plurality of terminals and a bandwidth obtained by proportionally distributing a surplus bandwidth other than the minimum transmission bandwidth in the proportion of the sum of the deficient bandwidth and the bandwidth to the sum total of the deficient bandwidths and the bandwidths when the sum total of the requisite bandwidths exceeds the transmission bandwidth of said transmission channel.

6. The line terminating equipment according to claim 5, wherein:

a known transmission bandwidth is allotted individually and constantly to all or a part of said terminals;

the untransmitted information content is content of transmission information to be transmitted via a transmission bandwidth other than the known transmission bandwidth, the transmission information being accumulated in said plurality of terminals and having not been completely transmitted;

said receipt-information-content measuring section measures, as said receipt information content, content of transmission information received via the transmission bandwidth other than said known transmission bandwidth, the transmission information being included in the transmission information received from said plurality of terminals; and

said record-depending-bandwidth computing section uses a transmission bandwidth other than said known transmission bandwidth as the transmission bandwidth precedingly allotted.

7. The line terminating equipment according to claim 5, further comprising

a communication controlling section for performing communication control relating to said transmission channel via said interfacing section, and wherein

said requisite-bandwidth computing section computes said requisite bandwidth as an increasing function having increasing rates for the receipt information content measured

and the untransmitted information content collected, the rates being suitable for an event and/or a state identified in a process of said communication control.

8. The line terminating equipment according to claim 5, wherein

said transmission-band allotting section computes a deficient bandwidth given as an increasing function of both the untransmitted information content collected and the receipt information content measured, and uses the deficient bandwidth for computation when the sum total of the computed requisite bandwidths is smaller than the transmission bandwidth of said transmission channel.

9. The line terminating equipment according to claim 8, wherein

said transmission-band allotting section computes a deficient bandwidth given as a monotone nondecreasing function of the untransmitted information content, and uses the deficient bandwidth for computation when the sum total of the computed requisite bandwidths is smaller than the transmission bandwidth of said transmission channel.

10. A line terminating equipment comprising:

an interfacing section for interfacing with a transmission channel formed in common between the interfacing section and a plurality of terminals;

a receipt-information-content measuring section for measuring receipt information content which is content of transmission information received from said plurality of terminals;

an untransmitted-information-content collecting section for collecting untransmitted information content which is content of transmission information which is notified by said plurality of terminals, accumulated in the terminals, and has not been completely transmitted;

a requisite-bandwidth computing section for computing a requisite bandwidth for each of said plurality of terminals as an increasing function of the receipt information content

measured and the untransmitted information content collected, the requisite bandwidth being a transmission bandwidth necessary to be allotted, the transmission bandwidth being of a band of said transmission channel; and

a transmission-band allotting section for allotting a transmission bandwidth to said plurality of terminals via said interfacing section and said transmission channel, the transmission bandwidth being equal to a product of the computed requisite bandwidth and a ratio δ, the ratio δ being a ratio of the transmission bandwidth of said transmission channel to a sum of: a product of a sum total of the computed requisite bandwidths and a coefficient γ (> 1); and a sum total of minimum transmission bandwidths to be allotted to the individual terminals.

11. The line terminating equipment according to claim 10, wherein:

a known transmission bandwidth is allotted individually and constantly to all or a part of said terminals;

the untransmitted information content is content of transmission information to be transmitted via a transmission bandwidth other than the known transmission bandwidth, the transmission information being accumulated in said plurality of terminals and having not been completely transmitted; and

said receipt-information-content measuring section measures, as said receipt information content, content of transmission information received via the transmission bandwidth other than said known transmission bandwidth, the transmission information being received from said plurality of terminals.

12. The line terminating equipment according to claim 10, further comprising

a communication controlling section for performing communication control relating to said transmission channel via said interfacing section, and wherein

said requisite-bandwidth computing section computes said requisite bandwidth as

an increasing function having increasing rates for the receipt information content measured and the untransmitted information content collected, the rates being suitable for an event and/or a state identified in a process of said communication control.

13. The line terminating equipment according to claim 5, wherein

said transmission-band allotting section monitors, based on a processing procedure of allotting the transmission bandwidth to said plurality of terminals, a sum total of surplus transmission bandwidths which are left unallotted to any of the terminals due to attribute and operation precision of an algorithm applied to the processing, and allots the surplus transmission bandwidths in the proportion of a prescribed bandwidth set in advance or given for each of the terminals to the whole prescribed bandwidth.

14. The line terminating equipment according to claim 10, wherein

said transmission-band allotting section monitors, based on a processing procedure of allotting the transmission bandwidth to said plurality of terminals, a sum total of surplus transmission bandwidths which are left unallotted to any of the terminals due to attribute and operation precision of an algorithm applied to the processing, and allots the surplus transmission bandwidths in the proportion of a prescribed bandwidth set in advance or given for each of the terminals to the whole prescribed bandwidth.

15. The line terminating equipment according to claim 10, wherein

the minimum transmission bandwidth to be individually allotted to said plurality of terminals is given as a contracted bandwidth of the terminals.

16. The line terminating equipment according to claim 5, wherein

said record-depending-bandwidth computing section computes the record-depending bandwidth for a terminal as an increasing function having a value equal to a prescribed bandwidth set in advance or given, even when the receipt information content measured and the untransmitted information content collected of the terminal are '0'.

17. The line terminating equipment according to claim 5, wherein

one or both of the increasing function by which the requisite bandwidth is obtained and the increasing function by which the record-depending bandwidth is obtained is/are increasing function(s) where errors in the requisite bandwidth and the record-depending bandwidth of all of said plurality of terminals are permissibly small.

18. The line terminating equipment according to claim 10, wherein

one or both of the increasing function by which the requisite bandwidth is obtained and the increasing function by which the record-depending bandwidth is obtained is/are increasing function(s) where errors in the requisite bandwidth and the record-depending bandwidth of all of said plurality of terminals are permissibly small.

19. The line terminating equipment according to claim 5, wherein

one or both of the increasing function by which the requisite bandwidth is obtained and the increasing function by which the record-depending bandwidth is obtained is/are approximate function(s) where errors in the requisite bandwidth and the record-depending bandwidth of all of said plurality of terminals are permissibly small.

20. The line terminating equipment according to claim 10, wherein

one or both of the increasing function by which the requisite bandwidth is obtained and the increasing function by which the record-depending bandwidth is obtained is/are approximate function(s) where errors in the requisite bandwidth and the record-depending bandwidth of all of said plurality of terminals are permissibly small.

21. The line terminating equipment according to claim 5, wherein:

the transmission information to be received from said plurality of terminals is a sequence of transmission units whose word lengths are fixed or can be considered to be fixed; and

said receipt information content, said untransmitted information content, said

requisite bandwidth, said record-depending bandwidth, and all transmission bandwidths are given as a ratio of the transmission bandwidth of said transmission channel to said word lengths or an average of said word lengths.

22. The line terminating equipment according to claim 10, wherein:

the transmission information to be received from said plurality of terminals is a sequence of transmission units whose word lengths are fixed or can be considered to be fixed; and

said receipt information content, said untransmitted information content, said requisite bandwidth, said record-depending bandwidth, and all transmission bandwidths are given as a ratio of the transmission bandwidth of said transmission channel to said word lengths or an average of said word lengths.